

CLAIMS

1. A method of reproducing data recorded in a first sequence, the data incorporating an error protection code applied on the basis of a predetermined size of data block, each error protection block comprising a series of several sub-blocks, the method comprising the following steps:

(a) Reading in parallel a set of N sub-sequences starting at N respective locations within said first sequence, said locations being chosen without restriction to said block or sub-block boundaries, the group of N sub-sequences encompassing a contiguous portion of the first sequence;

(b) During said reading step, identifying within each sub-sequence a series of sub-blocks forming a part of a data block and, in the absence of data from the start of the block, processing the series of sub-blocks in accordance with predetermined rules to accumulate a partial error protection syndrome relating to said block;

(c) Upon reaching the end of said block, accumulating a syndrome for a next block within the sub-sequence;

(d) During said reading step subsequently identifying in another of said sub-sequences a series of sub-blocks forming a starting part of the block whose end part has been processed and processing said sub-blocks to accumulate the remainder of said syndrome; and

(e) Combining the remainder of said syndrome with the stored partial syndrome so as to obtain a complete syndrome for the block.

2. A method as claimed in claim 1 wherein the method further comprises (f) jumping to a new set of locations in said first sequence and reading in parallel a further group of N sub-sequences to cover a further portion of the first sequence, said further portion being contiguous or overlapping with the preceding one, while step (d) includes identifying said starting part of the block among the further group of sub-sequences.

3. A method as claimed in claim 1 wherein said sub-blocks are regarded as rows or groups of rows of a two-dimensional matrix, step (b) including performing an inner error correction on rows the matrix, while the syndrome accumulated in steps (c)-(e) is applied to columns of the matrix in a
5 outer correction process.

4. A method as claimed in claim 1 wherein the method is performed using distinct local and remote storage for temporary storage of syndromes, said partial syndrome being accumulated in local storage in step (b); the
10 accumulated partial syndrome being transferred to said remote storage in step (c).

5. A method as claimed in claim 4 wherein said transferring step (c) is performed each time in association with said jumping step.
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6. A method as claimed in claim 1 wherein the partial syndromes are combined during reading of the starting part of the block, said partial syndrome being transferred from the remote storage back to the local storage in step (d) for accumulation of the remainder of said syndrome in said local
20 storage.

7. A method as claimed in claim 6 wherein said partial syndrome and the accumulated remainder are combined away from said local storage.

8. A method as claimed in claim 1 wherein the local storage provides fewer than $5N/2$ syndrome buffers .
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9. A method as claimed in claim 1 wherein the local storage provides fewer than $3N/2$ syndrome buffers.
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10. A method as claimed in claim 1 wherein the data recorded in said first sequence comprises data recorded in a spiral on a disc-like record carrier.

11. A method of data retrieval in multi-track data read-out, the data comprising is Digital Versatile Disk (DVD) data recorded on an optical disc, wherein partial error correction syndromes are calculated for parts of different Error-Correcting Code (ECC) frames encountered by each beam, stored while
5 other ECC frames are decoded, and used as a basis for accumulating the complete syndrome.

12. A method as claimed in claim 11 wherein the partial syndromes
10 are stored remotely from the syndrome generator, and restored when the remainder of the respective ECC frame is encountered by a different beam, for use in accumulating the complete syndrome.

13. An apparatus for reproducing data stored on a record carrier, the
15 apparatus comprising disc transport means including a pickup for reading data from the carrier, signal processing means for recovering data from the carrier and a decoder for decoding and error-correcting the data read from the carrier, in accordance with error correcting codes included therein, wherein the pickup is adapted for reading multiple-channels in parallel to recover plural sub-
20 sequences of a first sequence of data recorded on the carrier, and wherein the decoder is arranged to implement a method according to any preceding claim.

14. A decoder comprising input means for receiving in parallel plural sub-sequences of a first sequence of data to be decoded, and wherein the
25 decoder is arranged to implement a method according to claim 1.

15. A decoder as claimed in claim 14 wherein the decoder comprises an integrated circuit including inner and outer correction error correctors, and buffers for the storage of at least one outer error correction syndrome per channel, and means for transferring a partial syndrome to
30 external memory after encountering the end of a block of data.